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Dinosaur Reservoir Fish Collection Summary 2001

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The Peace/Williston Fish & Wildlife Compensation Program is a cooperative venture of BC Hydro and the provincial fish and wildlife management agencies, supported by funding from BC Hydro. The Program was established to enhance and protect fish and wildlife resources affected by the construction of the W.A.C. Bennett and Peace Canyon dams on the Peace River, and the subsequent creation of the Williston and Dinosaur Reservoirs.

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Abstract

Dinosaur Reservoir was formed in 1979 after the completion of the Peace Canyon Dam. The dam has backed water up into a bedrock canyon for 20.5 km to the tailrace of W.A.C. Bennett Dam to form a run of the river reservoir with a three-day water retention period. A number of enhancement projects aimed at addressing fish habitat limitations and entrainment problems, are planned for the reservoir. In order to evaluate the effectiveness of these activities, baseline fish data was needed. In October 2001, boat electrofishing and trap netting projects were carried out in Dinosaur Reservoir to assess the effectiveness of this sampling gear in the reservoir. Ten different species of fish were captured by boat electrofishing. Rainbow trout (n=191) (*Oncorhynchus mykiss*) and mountain whitefish (n=183) (*Prosopium williamsoni*) were the most abundant species captured. Also captured were 9 lake trout (*Salvelinus namaycush*) which ranged in size from 191mm to 347mm F.L and 20 bull trout (*Salvelinus. confluentus*). Day time electrofishing was not as effective as night electrofishing and sampling offshore captured fewer fish than sampling along the shoreline. The trap nets were only fished during the day and captured 7 different species; and far fewer total fish.

Introduction

Dinosaur Reservoir was formed in 1979 after the completion of the Peace Canyon Dam. This run of the river reservoir is 20.5 km long and backs water up to the tailrace of W.A.C. Bennett Dam. A number of studies have been conducted on this reservoir to evaluate fish stocking programs (Hammond 1984, 1986a, 1986b, 1986c, 1987a, 1987b, 1988, Joslin 2001 a & b) and to look at habitat limitations and potential enhancements (Pattenden and Ash 1993, Ash and McLeod 1994, Aim Ecological Consultants 2000). As a result of these studies a number of enhancement projects aimed at addressing fish habitat limitations, entrainment problems, and stocking assessments are planned for the reservoir. In order to evaluate the effectiveness of these activities, baseline fish data will be needed. In October 2001, boat electrofishing and trap netting projects were carried out in Dinosaur Reservoir to assess the effectiveness of this sampling gear in the reservoir. Boat electrofishing captured 191 rainbow trout (*Oncorhynchus mykiss*) and 183 mountain whitefish (*Prosopium williamsoni*) in addition to eight other species including lake trout (*Salvelinus namaycush*). Trap nets were fished only during the day and captured fewer species (7) and far fewer fish.

Study Area

This steep sided reservoir is 20.5 km long and covers an area of 805 ha, of which 400 ha is a bedrock river channel (Hammond 1984). Water retention time is about three days and daily water fluctuations are normally less than two metres. Low water usually occurs at night, but levels are determined by the operation of the dams. The reservoir is isothermal throughout the year (Pattenden and Ash 1993) and intake water temperatures (from WAC Bennett Dam) are in the range of 2 to5 °C from November to June and seldom exceed 10°C even in August. Johnson and Gething Creeks are the only significant spawning and rearing tributaries for wild sport fish populations in Dinosaur Reservoir (Pattenden and Ash 1993). The length of tributary streams accessible to fish from the reservoir is limited to 500m of Johnson Creek, which has extreme silt load problems (pers obs), and 600m of Gething Creek. There are several other smaller tributaries but these have intermittent flows and very short accessible lengths because of barriers to fish passage.

Methods

Electrofishing was initiated on October 2nd after dark. The boat used was an 18 ft Smith-Root electrofishing boat powered by a 115 hp outboard jet. The jet was necessary so that the boat could get close to shore and operate in shallow water. The electrofishing unit used was a Smith Root GPP 5.0 electrofisher powered by a 5000 W generator. The unit was used on DC current at 60 Hz and the voltage was between 500 and 700 volts. Two netters stood on the bow of the boat and captured stunned fish, which were placed in holding tanks on deck. After electrofishing was completed at each site all captured fish were identified, measured, recorded and released. The boat moved slowly close to the shoreline and covered each area once. Electrofishing times were kept fairly consistent with an effort between 1111 seconds and 1280 seconds for each site. The areas sampled

were distributed throughout the reservoir and covered a variety of habitat types (Figure 1).

On October 3rd a crew of 4 people electrofished during daylight hours and a crew of 5 electrofished after dusk. The sampling focus was shoreline habitat, however, one sampling transect was conducted approximately 100 m from shore in 2 to 4 m of water.

Two small mesh (4mm) trap nets, were set each morning in shallow flat areas near the electrofishing sites (Figure 1). Nets were set between 0900 hrs and 1000 hrs and pulled between 5:30 pm and 7:30 pm of the same day. The traps were set in shallow (<3m) areas and because daily water fluctuations are not predicable (usually up to 2 m, with low water occurring at night) the nets were not fished overnight to avoid stranding caught fish in the trap nets.

Results

Eleven electrofishing sites were sampled and the most commonly captured species were rainbow trout and mountain whitefish (Table 1, 2).

Table 1. Number and species of fish captured by electrofishing and trap nets from Dinosaur Reservoir in October 2001.

Common Name	Scientific Name	Species Code	No. Captured
Rainbow Trout	*Oncorhynchus mykiss*	RB	205
Mountain Whitefish	*Prosopium williamsoni*	MW	190
Peamouth Chub	*Mylocheilus caurinus*	PCC	69
Longnose sucker	*Catastomus catastomus*	LSU	42
Bull Trout	*Salvelinus. confluentus*	BT	20
Kokanee	*Oncorhynchus nerka*	KO	10
Lake Trout	*Salvelinus namaycush*	LT	9
Lake Whitefish	*Coregonus clupeaformis*	LW	5
White sucker	*Catastomus commersoni*	WSU	1
Redside shiner	*Richardsonius balteatus*	RSC	1
Northern Pike Minnow (Squawfish)	*Ptycheilus oregonensis*	NSC	1

The catch per unit effort (CPUE) ranged from 0.004/minute for white suckers and shiners to 0.89/minute for rainbow trout (Figure 2, Table 3). Catch per unit effort was higher during the night than it was in daylight hours (Figures 3, 4), except for bull trout. The number of fish captured from the 7 near shore sites sampled at night ranged from 45 to 92 fish. Site 3 had notably more rainbow trout than any other site. (Table 2).
Site 11 was a transect 100 m from shore (an attempt to capture spawning lake trout) and is therefore not comparable to the other sites. Over 50% of the fish captured were less than 20 cm in length (Figures. 5, 6, 7), which was surprising since juvenile rearing and spawning habitat was thought to be limited in the reservoir (Ash and McLeod 1994), Average fork lengths are shown in Table 4.

Table 2. Number of fish captured at each electrofishing site from Dinosaur Reservoir in October 2001.

Species	Site Total	Site Number 1	2	3	4***	5***	6***	7	8	9	10	11
Rainbow *	8	3	1	2							2	
Rainbow	191	14	20	61	10	16	8	13	27	10	11	1
Mountain Whitefish	184	19	11	4	3	17	6	16	22	33	51	2
Lake Whitefish	4							2	1		1	0
Lake Trout	9	2	1					3	2	1		
Kokanee	9	1		1		1		2	3		1	
Bull Trout	15	1			2	4	1	1	2	1	3	
Longnose Sucker	42	6	12	3		1	2	5	11		1	1
Pea Mouth Chub	67	1	13	10	1	1		9	24	6	2	
White Sucker	1	1										
Redsided Shiner	1											1
Total	531	45	57	79	16	40	17	51	92	51	70	5
Effort (seconds)	13412	1215	1111	1234	1234	1269	1217	**1219	1164	1246	1223	1280

* hatchery - adipose clipped

**mean time, effort not recorded for this set

*** sample collected during the day

Table 3. Electrofishing CPUE (No. fish captured per minute of electrofishing) from Dinosaur Reservoir in October 2001.

Site	Effort (min)	.fish captured / minute electrofishing Rb	MW	LW	LT	KO	BT	LSU	PCC	WSU	RSC	Total
1	20.3	0.84	0.94	0.00	0.10	0.05	0.05	0.30	0.05	0.05	0.00	2.22
2	18.5	1.13	0.59	0.00	0.05	0.00	0.00	0.65	0.70	0.00	0.00	3.08
3	20.6	3.06	0.19	0.00	0.00	0.05	0.00	0.15	0.49	0.00	0.00	3.84
4*	20.6	0.49	0.15	0.00	0.00	0.00	0.10	0.00	0.05	0.00	0.00	0.78
5*	21.2	0.76	0.80	0.00	0.00	0.05	0.19	0.05	0.05	0.00	0.00	1.89
6*	20.3	0.39	0.30	0.00	0.00	0.00	0.05	0.10	0.00	0.00	0.00	0.84
7	20.3	0.64	0.79	0.10	0.15	0.10	0.05	0.25	0.44	0.00	0.00	2.51
8	19.4	1.39	1.13	0.05	0.10	0.15	0.10	0.57	1.24	0.00	0.00	4.74
9	20.8	0.48	1.59	0.00	0.05	0.00	0.05	0.00	0.29	0.00	0.00	2.46
10	20.4	0.64	2.50	0.05	0.00	0.05	0.15	0.05	0.10	0.00	0.00	3.43
11	21.3	0.05	0.09	0.00	0.00	0.00	0.00	0.05	0.00	0.00	0.05	0.23
Mean		0.89	0.82	0.02	0.04	0.04	0.07	0.19	0.30	0.004	0.004	2.38

* sample collected during the day

Table 4. Mean fork lengths of fish captured from Dinosaur Reservoir in October 2001.

Species	Mean F.L.(mm)	No.	SD	Range (mm)
Rainbow Trout	199	197	49.74	29-350
Bull Trout	216	20	66.03	25-290
Lake Trout	278	9	52.62	191-347
Kokanee	158	9	73.01	66-238
Mountain Whitefish	177	190	75.76	56-343
Lake Whitefish	289	7	37.74	245-335
Peamouth Chub	183	69	34.66	73-233

Trap nets did not catch the same number or variety of species as the boat electrofishing (Table 5); however the traps were not set overnight. Trap 3 which captured 5 bull trout was set in the stream channel off the mouth of Johnson Creek (Figure 8).

Table 5. Number and species of fish captured using trap nets.

Species	Total	Trap 1	Trap2	Trap 3	Trap 4
Rainbow Trout	6	2	1	1	2
Bull Trout	5	0	0	5	0
Mountain Whitefish	6	1	1	2	2
Lake Whitefish	2	0	1	0	1
Peamouth Chub	2	0	0	1	1
Longnose Sucker	5	3	1	1	0
Northern Pikeminnow	1	0	1	0	0
Total	27	6	5	10	6

Discussion and Management Recommendations

Boat electrofishing appears to be an effective method of sampling near shore fish populations in Dinosaur Reservoir. Electrofishing was more effective (higher CPUE) at night than during the day (Figures 3, 4).

The crew observed concentrations of rainbow trout wherever woody debris occurred (Sites 3 and 8). Areas sampled varied in complexity; more multifaceted shorelines with woody debris took much longer to sample and contained higher numbers of fish per unit area than did less complex sites. However, the CPUE data collected in this assessment (based on time) does not adequately indicate the concentrations of fish because more area was covered in less complex sites. Future assessments should therefore be based on catch/unit area as well catch/unit time. Catch/area data would also be useful for comparing shorelines before and after enhancements, such as the addition of woody debris, establishment of submergent and emergent vegetation and the addition of structures to shoal areas. Index sites should be located at sites where enhancements are planned and in areas with similar habitat with no planned enhancements. This would to provide an experimental and control situation with before and after data.

The electrofishing did not assess the presence of marked rainbow trout at the same level as reported in creel surveys. A creel survey conducted in the summer of 2000 in Dinosaur Reservoir (Joslin 2001b) found that 37of 105 (35%) rainbow trout captured were hatchery fish (adipose clipped). Four percent or 8 of 197 rainbow captured by boat electrofishing were adipose clipped. However, Dinosaur Reservoir has a minimum catch size limit of 25 cm, effectively eliminating smaller size groups from the creel. If fish smaller than 25 cm are eliminated from the electrofishing data, 8 of 53 or 15% of the rainbow trout were adipose clipped. The creel survey collected data from May through September and the capture of clipped (hatchery) fish was highest just after the fish were released (Joslin 2001b). Boat electrofishing will probably not be an effective method to evaluate the contribution of the stocked fish to the fishery because of temporal differences in availability of hatchery fish, and possible differences in distribution and catchability between the hatchery and wild fish.

In this study, the trap nets were not as effective at capturing fish as boat electrofishing. However, if nets were fished overnight in slightly deeper water the data collected could complement the boat electrofishing work and provide information on species utilization of slightly deeper habitats which are difficult to electrofish effectively. Larger adult trap nets could also be used to collect information on species utilizing offshore habitats. Unfortunately, due to the steep sided nature of the reservoir there are limited areas where trap nets would be effective. In certain areas however, trap nets would provide an additional sampling technique.

Spawning and juvenile rearing habitat was assumed to be limiting in the reservoir (Pattenden and Ash 1993). However, a high percentage of the fish captured in the study were small (<20 cm, Figures 5, 6, 7). Whether these small fish are a result of entrainment through W.A.C. Bennett dam or if they are being produced in Dinosaur Reservoir is unknown. The small size could also be a result of sampling bias with efforts concentrated in shallow shoreline areas normally associated with juvenile rearing. Further investigations are warranted to look for potential spawning locations particularly for mountain whitefish (which could be spawning in the outlet of WAC Bennett Dam) and rainbow trout, which are believed to utilize the tributary streams. Several juvenile lake trout were also captured and the potential for this species reproducing in the reservoir should also be investigated further.

Literature Cited

Aim Ecological Consultants Ltd. 2000. Dinosaur Lake aquatic plant enhancement potential. Peace Williston Fish and Wildlife Compensation Program Report No. 259 26pp. plus appendices.

Ash, G. and C. Mcleod, 1994. GMS tailrace weir excavation project: Fish habitat assessment. R.L.& L. Environmental Services Ltd. Prepared for B.C. Hydro Environmental affairs. 19pp. plus appendices

Hammond, R.J. 1984. Evaluation of Dinosaur Lake stocking program (1983 – year 1). B.C. Fish and Wildlife Branch. 30p plus appendices

_____ 1986a. Evaluation of Dinosaur Lake stocking program (1984 – year 2) B.C. Fish and Wildlife Branch 30pp. plus appendices.

_____1986b. Dinosaur Lake summer creel census, 1985. B.C. Ministry of Environment and Parks, Recreational Fisheries Branch 30pp. plus appendices

_____1986c. Peace River summer creel census 1985. B.C. Ministry of Environment and Parks, Recreational Fisheries Branch Unpublished report 19pp.

_____1987a Evaluation of Dinosaur Lake stocking program summary report. B.C. Ministry of Environment and Parks, Recreational Fisheries Branch Report No. PCE 15. 11pp.

_____1987 b. Evaluation of Dinosaur Lake stocking program (1986) – year 4. B.C. Ministry of Environment and Parks, Recreational Fisheries Branch. Rept. No. PCE 13.49pp. plus appendices

_____1988 Dinosaur Lake summer creel survey, 1987. B.C. Ministry of Environment and Parks Recreational Fisheries Branch. Rept. No. PCE 17 21 pp.

Joslin , J. 2001a. 1999 Dinosaur Reservoir creel survey report. Peace Williston Fish and Wildlife Compensation Program Report No. 238 19pp. plus appendices

Joslin, J. 2001b. 2000 Dinosaur Reservoir creel survey report. Peace Williston Fish and Wildlife Compensation Program Report No. 257 22pp. plus appendices

Pattenden, R. and G. Ash. 1993. Fisheries enhancement options for Dinosaur Lake, A Review. Peace Williston Fish and Wildlife Compensation Program Report No. 72. 38pp. plus appendices.

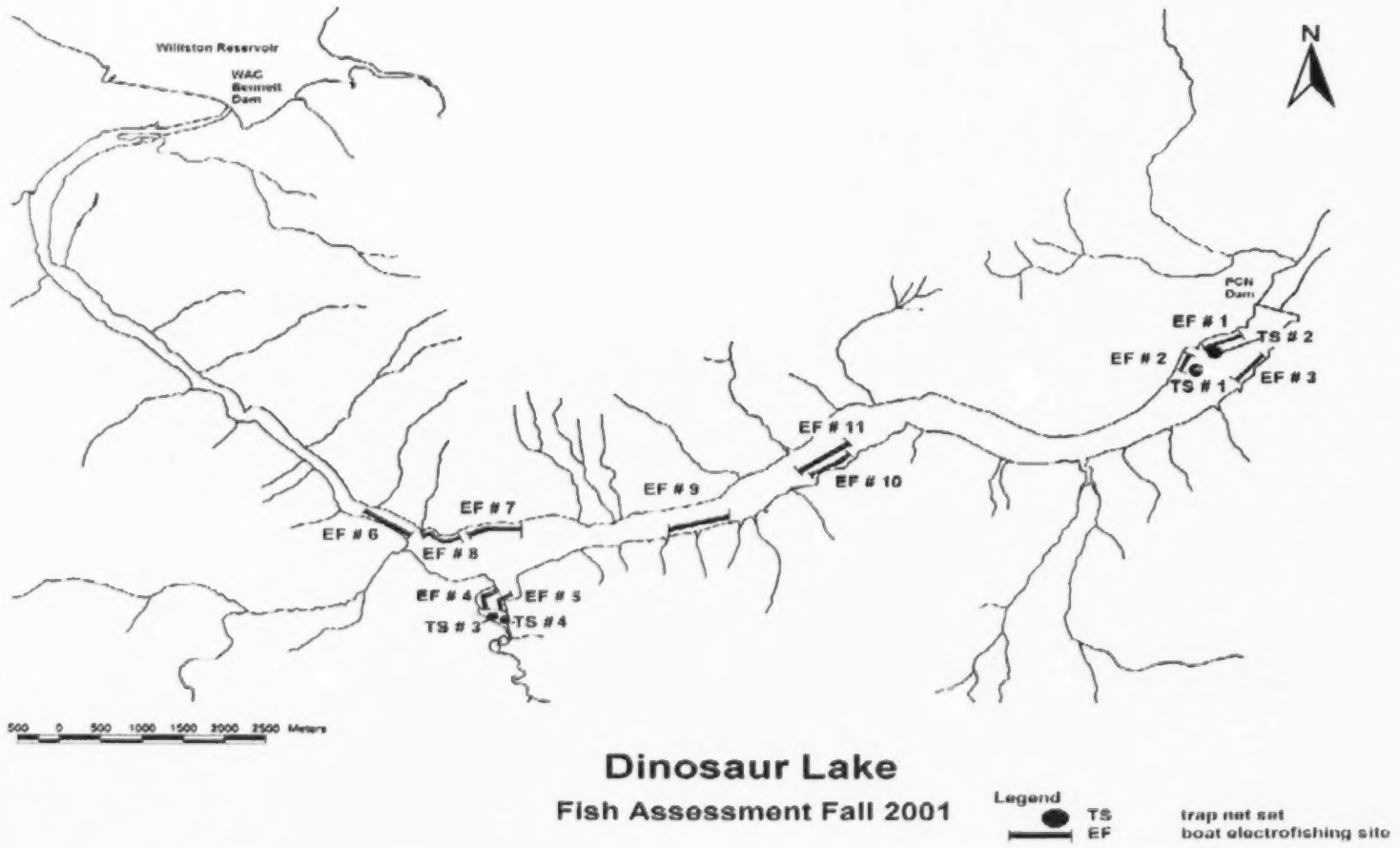

Figure 1. Boat Electrofishing and Trap Net sites in Dinosaur Reservoir in October, 2001.

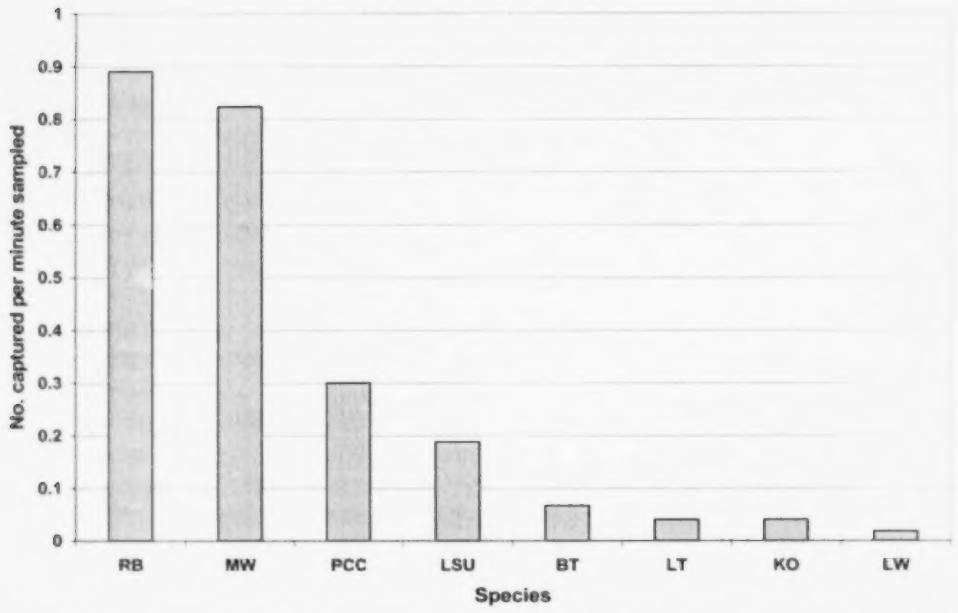

Figure 2. Total number of fish captured by boat electrofishing from Dinosaur Reservoir in October 2001.

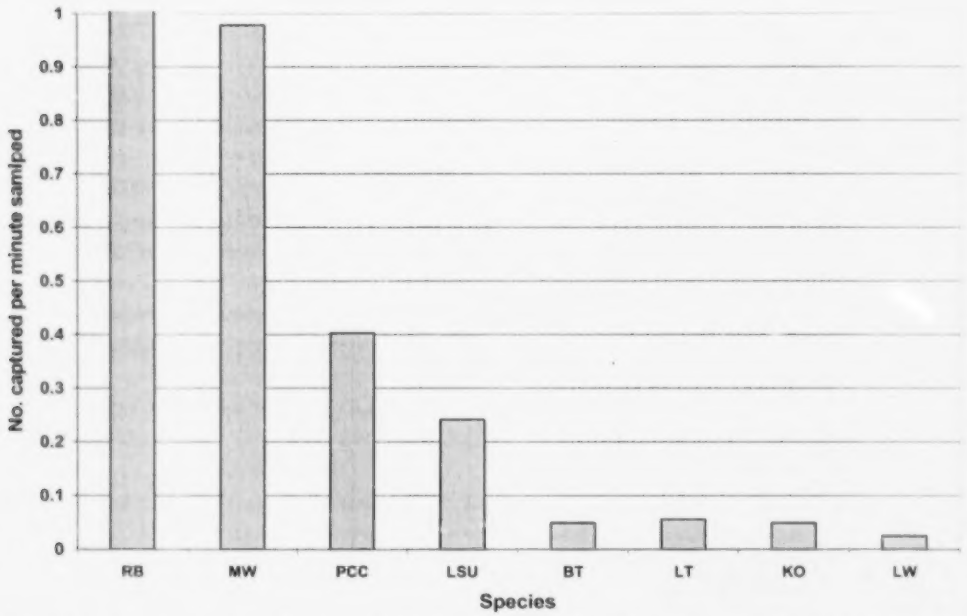

Figure 3. Number of fish captured by boat electrofishing between 2100hrs and 2400hrs (night) from Dinosaur Reservoir in October, 2001.

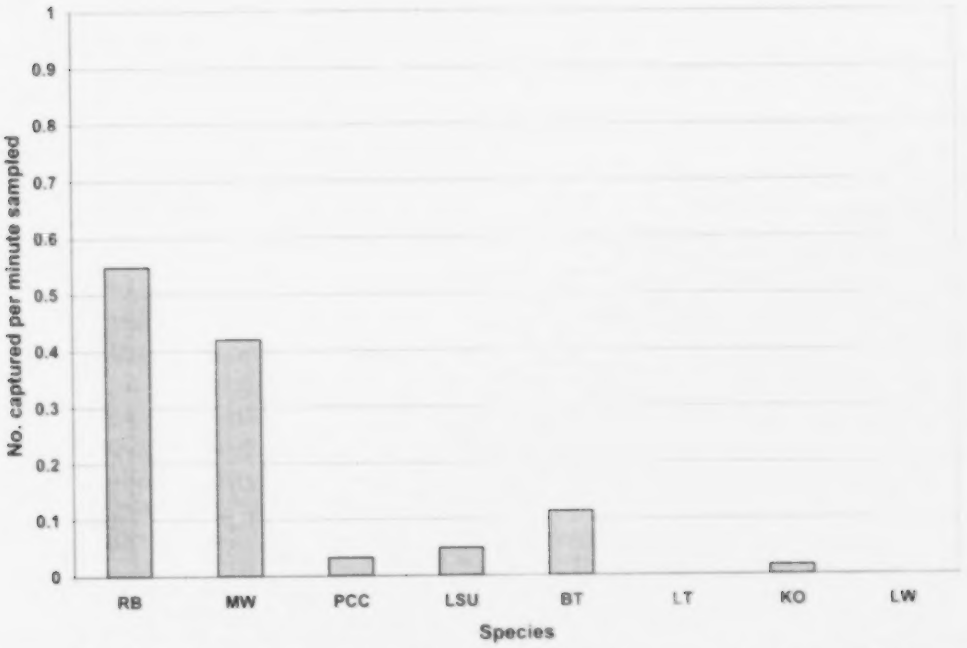

Figure 4. Number of fish captured by boat electrofishing between 0900hrs and 1200hrs (daylight) from Dinosaur Reservoir in October 2001.

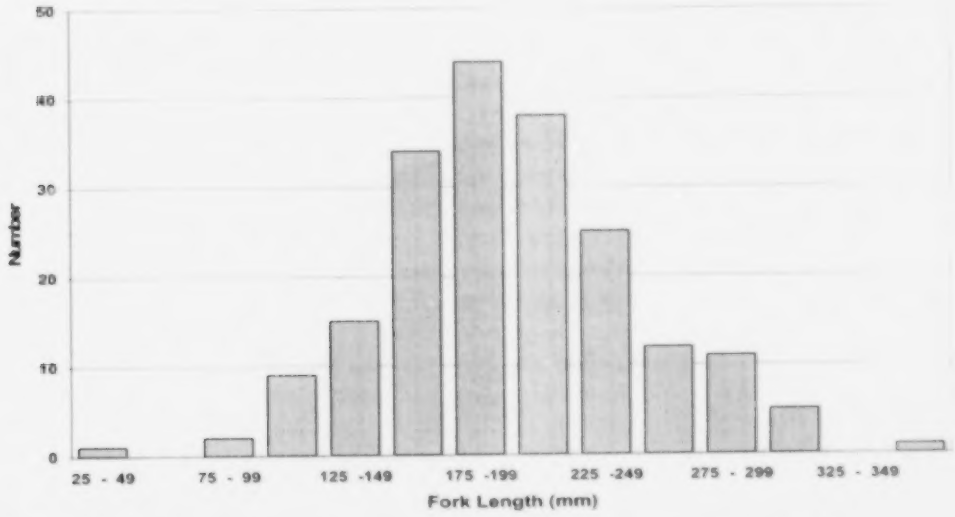

Figure 5. Length Frequency Distribution of all Rainbow Trout captured by boat electrofishing from Dinosaur Reservoir in October 2001.

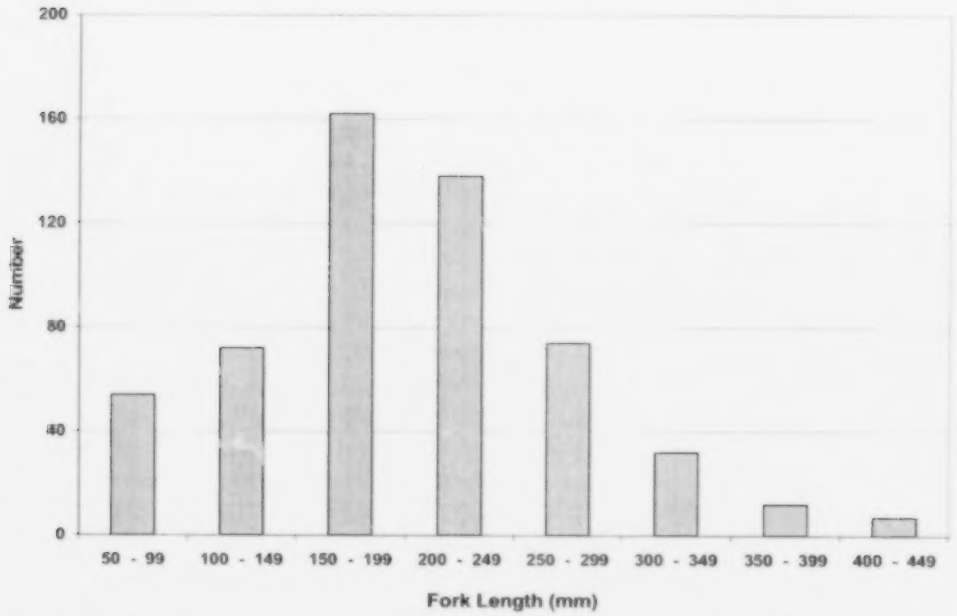

Figure 6. Length Frequency distribution of all species captured by boat electrofishing from Dinosaur Reservoir in October 2001.

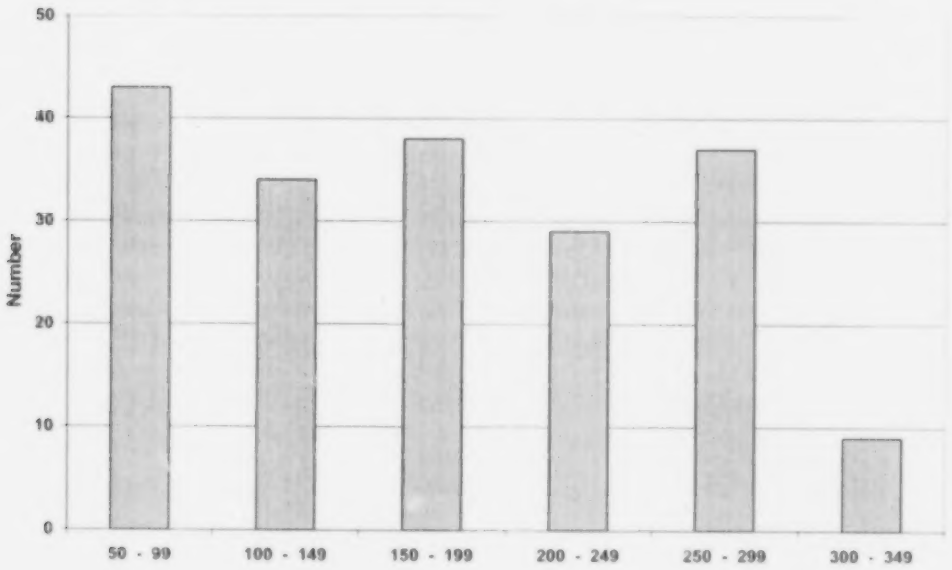

Figure 7. Length Frequency Distribution of all Mountain Whitefish captured by boat electrofishing from Dinosaur Reservoir in October 2001.

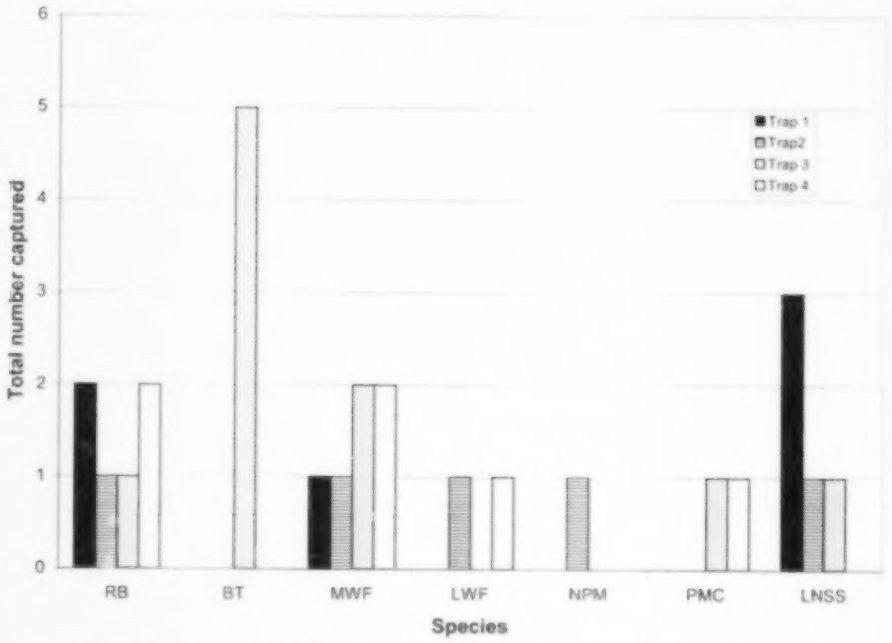

Figure 8. Total number of fish captured by trap nets from Dinosaur Reservoir in October 2001.